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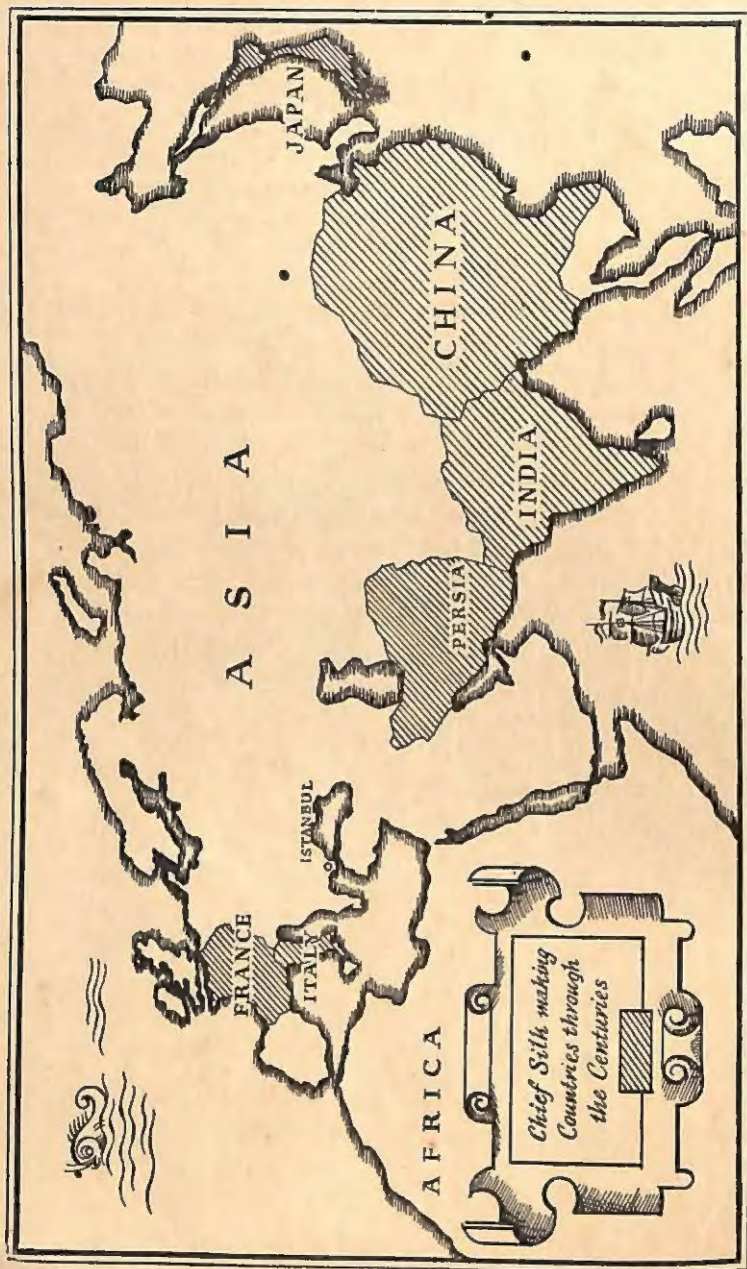
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SILK

by  
GWEN CROSS

539  
THINGS WE USE

BOOK TWENTY-THREE

LONGMANS





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CHAPTER I

SILK

FOR thousands of years men have used the fibres of plants and the hair of animals for their clothes. Before 2500 B.C. the Chinese got the finest, strongest and most beautiful thread from the cocoon of an insect larva, the silkworm. The story tells that Se-ling-she, the wife of the Emperor Hwang-te, made the first loom for weaving this silk thread.

The Chinese kept silk a secret for 3000 years. Traders took the cloth to other lands. Rich ladies in Rome wore silk dresses before the birth of Christ. In the first century A.D. Queen Boadicea, in Britain, exchanged Roman prisoners for a Roman silk dress.

In the third century A.D. Japan learnt how the Chinese made silk. The silkworm only makes the best silk when it has the leaves of the mulberry tree for its food. The climate in Japan was good for both silkworms and mulberry trees. Japan soon had many silkworm farms and made silk.



MULBERRY LEAVES

## SILK

In the sixth century A.D., Persia traded silk cloth in Europe, and often sold it for its weight in gold! Justinian, Emperor in Constantinople,<sup>1</sup> wanted silk very much. He sent two monks to China to try to learn the secret. They brought him mulberry seeds, and silkworm eggs hidden in a hollow stick!



TWO MONKS CARRYING SILKWORM EGGS  
IN THEIR HOLLOW STICKS

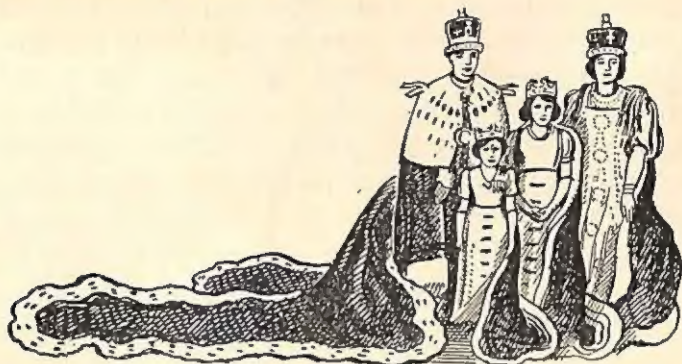
Between the twelfth and fifteenth centuries, the care of silkworms spread to Sicily, Italy, France and England. The people of Lyons in France, kept millions of silkworms and mulberry trees. Nottingham in England also became important for silk. The English wove beautiful silk cloth. Richard II had a silk coat that cost thousands of pounds.

In 1852 a sickness killed millions of silkworms in France and damaged the French silk trade. England made less silk because sudden cold weather often killed the silkworms. In 1932 an English woman, Lady Hart Dyke, began a silkworm

<sup>1</sup> Now called Istanbul.

## SILK

farm. In 1938, silk from this farm was used in the Coronation Robes of George VI; and in 1947 in the wedding dress of Queen Elizabeth II.



KING GEORGE VI AND THE ROYAL FAMILY  
IN THEIR CORONATION ROBES

At different times, China, Japan, India, France and Italy have all been the chief silk-making countries. Today Japan is the most important. In 1934, one tenth of the land in Japan was planted with mulberry trees. Two million Japanese cared for silkworms. In 1938 Japan made 87 million lbs. of raw silk, and exported 63 million lbs.

### THINGS TO DO

1. Try to get small pieces of cloth (2 inches square) made of (a) different plant fibres, *e.g.*, cotton, flax, jute. (b) different animal fibres, *e.g.*, wool. Try to find pictures of these plants and animals. Trace them or, if you may, cut them out.

Keep all these things carefully until you have read Chapter IV.



## SILK

2. Ask your teacher to read you the story of Louis Pasteur and the silkworms.

Also read if you can: Things We Use, Book 10, *Cotton*, and Book 9, *A Woollen Blanket*.

OR Make a weather chart in your book for this week. Make seven one-inch squares on the page. Date each one. Draw in each a picture to tell you what the weather was like that day. What pictures can you use easily to show: a fine day; a dull day; a wet day?

### QUESTIONS

1. Silk can only be made in some countries. Why?
  2. Name two countries in Asia and two in Europe that have made much silk.
  3. What damaged the silk-making trade in France in the nineteenth century?
  4. Tell how the Emperor Justinian was able to begin silk making in his country.
- A. Some nouns have different words, or different endings to the same word to show male and female. This is called gender.

Write the male gender for these words:

*wife hen cow empress*

Write the female gender for these words:

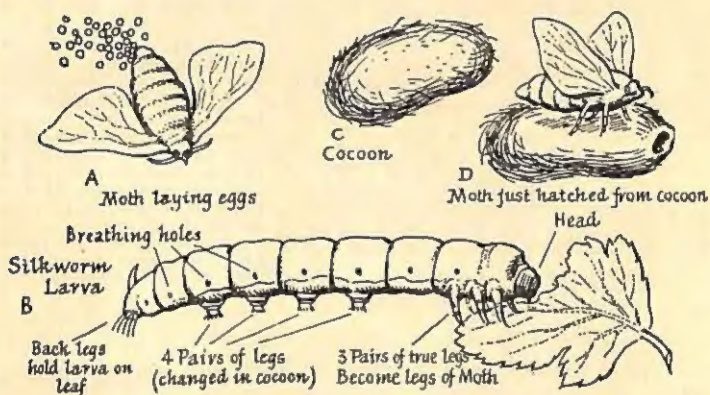
*uncle son king drake*

- B. What do the letters B.C. and A.D. mean?
- C. Copy from this chapter ten verbs that are in the past time. Beside each, write the same verb in present time.

## CHAPTER II

### A SILKWORM FARM

WHEN the silkmoths come out of the cocoons they live only for a few hours. On a silkworm farm, each moth is put into a paper bag to lay its eggs. It lays 400 small, yellow eggs. 35,000 eggs weigh only one ounce. The farmer washes and dries the eggs.



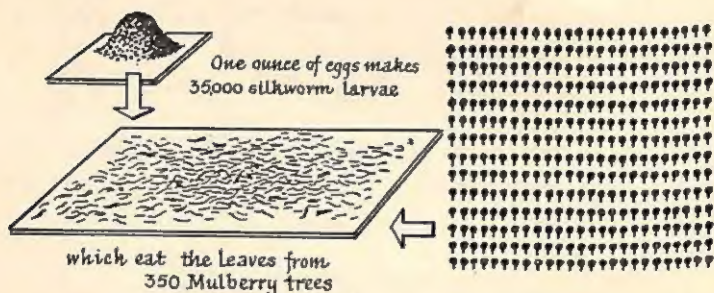
THE LIFE OF A SILKWORM IN PICTURES

The eggs hatch on clean paper, on trays in the silkworm house. One hundred larvae, each one tenth of an inch long, can lie on one square inch of the tray. They eat young, dry, cut up mulberry leaves.

## SILK

Silkworms are very shy. They do not like smoke, noise, smells, or to be touched! They become ill if they eat wet leaves; if they are too many together; if they are too cold or too hot; if they are on a dusty or dirty shelf. They die if they are in a wind.

A silkworm farm must have many mulberry trees. 4000 dwarf trees will grow on one acre. The silkworms from one ounce of eggs will eat half a ton of leaves! In the United States of America, machines are used to collect the leaves and take them to the silkworms every four hours.



Silkworms change their skins four times. Each time they double their size and need twice as many trays. After the fourth change they are four inches long. One hundred silkworms now need three square feet of tray. They eat without stopping for 14 days!

Then each silkworm climbs up into branches of twigs. From a little hole under the jaws, two silk threads come out, covered with gum. They stick



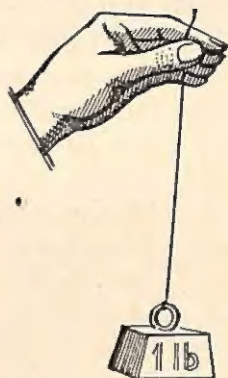
## A SILKWORM FARM

together to make one thread. This is finer than a human hair. 4000 yards will lie in a teaspoon. It is very strong. One thread will hold a weight of 16 ounces. It is elastic. A yard will stretch 5 or 6 inches.

The silkworm makes a silk cover or cocoon round its body in three days. To do this, it moves its head 300,000 times!

The thread of one cocoon often measures 2000 yards. One ounce of thread may measure 100,000 yards. 3000 cocoons make one pound of raw silk, which may measure 900 miles!

The farmer keeps some cocoons for the moths to come out and lay eggs for next year's silkworms. He bakes the other cocoons to kill the moths. He sells the dry cocoons.



A ONE POUND WEIGHT  
HELD BY A SINGLE  
THREAD OF SILK

### THINGS TO DO

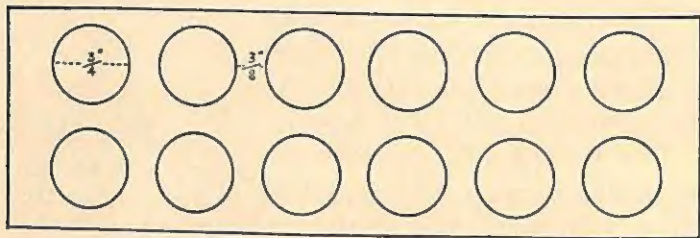
1. If you can, get about 20 silkworm eggs. Put the eggs on paper in a box in a warm place. You can feed the larvae on young, dry lettuce leaves if you cannot get mulberry leaves. Write notes about all that you can see until some silkworms have made their cocoons. Draw pictures of the silkworms.

2. Read paragraph three again. Make a paper net

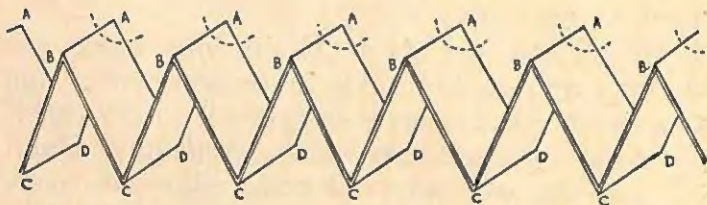
## SILK

so that you will not need to touch your silkworms. You can do this in two ways:

- (i) Get a punch that makes holes in paper. Get sheets of paper the size of your box. Put 10 sheets together. Punch holes in the sheets. For big silkworms you need holes  $\frac{3}{4}$ " wide and  $\frac{3}{8}$ " from one another.



OR(ii) Take a sheet of paper the size of your box. Fold it backwards and forwards in half inch wide folds. Then fold in the same way the already folded paper. With sharp scissors cut each corner with a curved line, through all the folds. When you open this paper it will have lines of holes. This is a paper net.



Put a paper net over the silkworms. Put fresh mulberry or lettuce leaves on it. The silkworms

## A SILKWORM FARM

will come up through the holes to eat the leaves. You can lift them out on the paper from the box and make the box clean.

### QUESTIONS

1. Copy into your book:

"From one ounce of silkworm eggs we get 100 lbs. of fresh cocoons.

These make 25 lbs. of dry cocoons.

From these we get 6 lbs. of raw silk."

How many leaves would the larvae from an ounce of eggs eat?

How many cocoons would make these 6 lbs. of raw silk?

2. Name the four stages in the life story of the silkworm.
3. How many times does a silkworm change its skin? How much bigger does it grow each time?
4. A friend asks you how to take care of silkworms. What would you say?

- A. In this picture each cross stands for one tray of silkworms. Starting with one tray it shows you how many trays you will need after the silkworms have changed their skins for the first and second times.

Put crosses to show the number of trays you will need after the third and fourth changes. Read again paragraph five.

One tray of silkworms.

×

After first change. Trays:

× ×

After second change. Trays: × × × ×

After third change. Trays:

After fourth change. Trays:

- B. Dwarf means something much smaller than its natural size. What word do we use for something much bigger than its natural size?

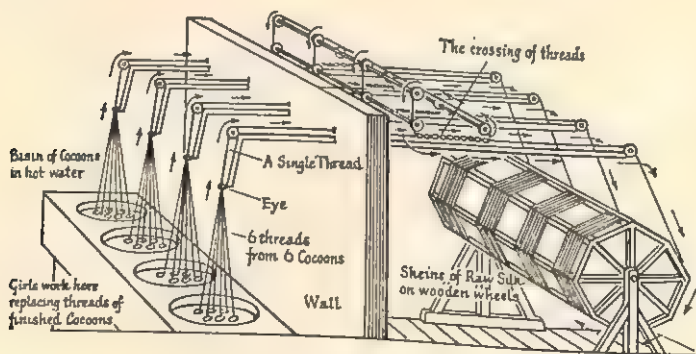


## CHAPTER III

### IN THE SILK FACTORY

THE farmer sells the dry cocoons and they go to the factory. Machines take the thick, outside floss from the cocoons. Then these are put into hot water to soak off some of the gum and make the threads loose.

A machine brushes the cocoons and pulls out some threads. The threads from six or more cocoons are put by hand through a small "eye". When one cocoon is finished the thread of another is taken. The six threads stick together to make a single thread. This is put round a wooden wheel to make a skein. We call this, reeling the silk. Twenty-five to thirty skeins make a "Book" of raw silk.



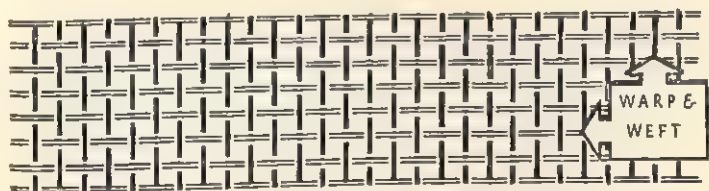
A MACHINE REELING THE SILK

## IN THE SILK FACTORY

In the throwing,<sup>1</sup> or twisting factory, each skein is soaked in a cotton bag, in soapy water. This takes away more gum and softens the thread. The thread is dried, twisted and put on to big reels called bobbins.

The machine makes the number of twists wanted in every inch of thread. Each twist takes time, and makes the silk cost more money. The twisted thread, called yarn, goes through a little hole to make it clean and smooth. Soft yarn, for weft threads in weaving, has two to five twists in an inch. A strong yarn with many twists is used for the warp threads. Crepe yarn has one hundred twists in every inch. Stocking yarn has forty to fifty twists.

The yarn on the bobbins is woven to make many



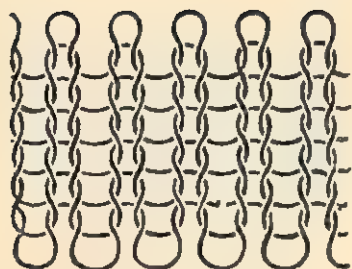
THE WEFT THREADS AND THE WARP THREADS  
IN A PIECE OF WEAVING

kinds of silk cloth; very thick, like brocade; very thin, like chiffon; very shiny, like satin. Silk in skeins, or cloth, dyes easily. All the waste and broken threads in the factory are made into cloth called spun silk.

Silk stockings are made with a knitting stitch in loops. An Englishman made the first stocking

<sup>1</sup> Thrawen is an old English word for "Twist".

## SILK



STOCKING STITCH

machine in 1589. In the sixteenth century men wore very long, coloured stockings. Henry VIII had two pairs of long, silk stockings, black silk and gold, and purple silk and gold.

In 1869 another Englishman made a machine that could put on more stitches or take away stitches. Then the machines could make a stocking the shape of a leg. Shaped stockings are called "fashioned" stockings. Stockings can now be shaped also by making the thread tighter or looser in different places. Some machines make the stockings in a circle. Others make them flat, and then sew the seam together. A large machine now makes thirty stockings at one time.

### THINGS TO DO

1. Use your cocoons from Chapter II if you have any. If not, try to get some silk cocoons. If they are fresh, let the moths come out of some of them. Bake the others. Take off the floss. Put them in hot water. Take off the silk thread on to a reel.
2. Try to get small pieces of different kinds of silk cloth (2 inches square) from shops or factories. Write down the name of each cloth. Try to find out all you can about the yarn used for each, and how it is woven.



## IN THE SILK FACTORY

3. Here are some names of silk cloth: brocade, tapestry, chiffon, georgette, satin, poplin, tulle, damask, plush, velvet, taffeta. How many others do you know?

OR

Try to visit a factory where silk stockings are made. What does one pair cost? Find out how many pairs of stockings the factory makes each year. Write a few sentences about one of the stocking machines you saw.

### QUESTIONS

1. What stitch is used in a stocking machine? Name two ways in which a machine can make stockings the shape of a leg.
2. What are: raw silk, a "book" of silk?
3. Where would you find waste silk in a factory? What do they make with it?
4. Which is the stronger, a yarn with many, or few, twists in every inch? Name a strong yarn. Would you use it for a weft or a warp thread?
- A. The word *fashion* has two meanings. What does it mean in sentence three of the last paragraph in the chapter?

What does it mean in these sentences:

In the sixteenth century it was the *fashion* for men to wear long stockings. Today it is the *fashion* for women to wear long stockings.

- B. In the word skein, the 'ei' is said like the 'ai' in train. In these words the 'ei' is said in many different ways. Copy the words in which it is said in the same way as in skein.

weight vein seize reign ceiling height  
eight freight neither neighbour receive neigh

## CHAPTER IV

### MAN-MADE SILK THREADS: RAYON AND NYLON

FOR many centuries men have tried to make a thread like silk. In 1889 a Frenchman made such a thread, but it was not strong enough to weave into cloth.

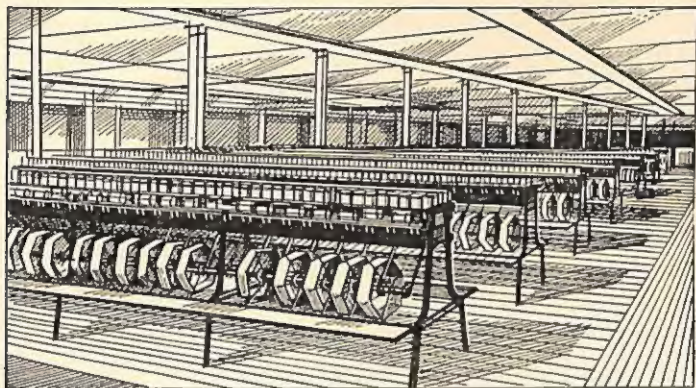
Since 1900 several threads have been made which can be woven or knitted to make a silk-like cloth. The first of these were called art silk, artificial silk, and celanese.

Now the threads rayon and nylon are often used for clothes, dresses, ties, ribbons, scarves and many other things. Each year the world uses more rayon and nylon and less raw silk. In 1900 the world used 2 million lbs. of man-made silk thread. In 1947 it used 27,000 million lbs. of rayon. When a lot can be made easily, a thing becomes cheaper. In 1920 rayon cost 4 dollars a lb. In 1948 it cost 67 cents a lb.

Unlike silk, rayon and nylon can be made in any country, because they are made of things men can get everywhere. Rayon threads are made from the cellulose of plants. Logs of trees of the pine tree family are best. They are cut into small pieces and boiled with something that has sulphur and lime in it. This makes wood pulp called sulphite pulp. Machines make it into flat sheets.

## MAN-MADE SILK THREADS

In the rayon factory the sheets are cut into pieces. They are dissolved in a liquid that evaporates quickly. This is pushed through a very little hole. It comes through like a very fine stream of liquid from a syringe. The liquid evaporates in warm air. The cellulose stays as a very fine, smooth, thread. This is rayon.



INSIDE A RAYON FACTORY

If a dye is put into the liquid the rayon thread will be coloured. Long rayon threads are twisted like yarn. Short threads can be spun. From the rayon factory we also get the thin, transparent sheets we call cellophane.

Nylon was first made in 1932. It is made of protein, like wool and silk. It is very much stronger than rayon or silk. Nylon stockings are made on machines and fashioned like other stockings. Then they are dyed. For this, they are put on to metal legs. After dyeing they are sprayed with hot water,



## SILK

and rubbed with rubber rollers. They are dried in hot air. Millions of dozens of pairs of nylon stockings are made each year in Great Britain, U.S.A., and other countries.

### THINGS TO DO

1. Try to find as many things as you can that are made of rayon or nylon. Write a list (a) of clothes (b) of other things made of these threads.

### OR

Visit a nylon factory if possible. Write a list of what is done with the nylon thread from the time it is made until the stockings are put into a box.

2. Try to get small pieces of rayon or nylon cloths (2 inches square). Cut paper the size you need to make a book. Fix in it all the small pieces of cloth you have collected, and any pictures you have traced or cut out. Print names in the book. Make a cover. Print a title on it.

### QUESTIONS

1. How are nylon stockings dyed?
2. Silk can only be made in some countries. Rayon and nylon can be made in almost all countries. Why is this?
3. Name three threads made of cellulose and three made of protein.
- A. Ask your teacher what the word *artificial* means. Name three artificial things.
- B. Write the opposite of:  
*transparent smooth fine cheap*
- C. How many is a dozen? Write in figures one million.

You may find these words difficult. When you meet them in the book, try to think out for yourself what they mean. If you cannot do this, ask your teacher for help.

*Nouns*

bobbin  
cellophane  
cellulose  
cocoon  
coronation  
fibres  
loom  
nylon  
rayon  
reel  
skein  
warp  
weather  
weft  
yarn

*Adjectives*

dwarf  
elastic  
fashioned  
human  
loose  
transparent

*Verbs*

dissolve  
double  
evaporate  
spray  
twist

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23. Silk
24. Leather

